TROPICAL DISEASES BUREAU.

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DISEASES DUE TO PROTOZOAN PARASITES.

CURASSON (G.). **Traitement des trypanosomiases du cheval en Afrique occidentale française.** [The Treatment of Equine Trypanosomiases in French West Africa.]—*Rec. Méd. Vét.* 1921. Dec. 15. Vol. 97. No. 23. pp. 689–694.

The author draws attention to the great similarity of the symptoms in cases of equine trypanosomiasis caused by different organisms, as, for example, chronic cases due to *T. pecaudi* and *T. dimorphon*, and expresses the view that in treating equine cases of trypanosomiasis the more important point to keep in mind is the nature of the infection, the causal agent being of less importance. Indications are given of the different forms of treatment that have been adopted, and the trypanosomiases are classed as acute, sub-acute and chronic.

A single intravenous injection of 2 gm. of galyl usually produces a remission of temperature, but a second rather smaller dose may be necessary on the following day. In no case should more than three doses be given.

Emetic and atoxyl.—The important point in connection with orpiment used in conjunction with emetic or atoxyl is to be certain of its purity and that it has not undergone decomposition, as it is likely to do. It is not rapid in action, and at the best it is only valuable for prolonging the effect of an injection of emetic or atoxyl. In severe cases the results are less constant than those obtained with galyl.

Toluidine blue has been used on about a score of cases, but relapses have occurred promptly.

Salicylate of soda and acetanilide are without effect. Quinine may be a valuable adjuvant to galyl or atoxyl as a febrifuge. Its injection is sometimes followed by suppuration. It was used in conjunction with antipyrine. A word of warning is uttered against the intravenous injection of this solution, as antipyrine causes coagulation of the blood. In sub-acute cases the treatment need not be so energetic and the indications favour combined methods, such as emetic-orpiment or atoxyl-orpiment, but in any case it is advisable to give a first injection which will clear the circulation, such as a gramme and a half of galyl. A careful watch should be kept and the galyl repeated if necessary.

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The author had five recoveries out of six cases of mixed *T. pecaudi* and *T. dimorphon* infection, by combining or rather by using alternately emetic and picric acid, the former given intravenously and the latter by the mouth in conjunction with opium.

In cases of a chronic nature attention to diet is more important than treatment by drugs, and complete restoration of condition may be brought about by special feeding alone, but a course of drug treatment hastens recovery. Two or three injections of atoxyl should be given to begin with, to be followed by arsenious acide in conjunction with strychnine. Arsenic in the form of arrhenal is said to give the best results.

i. Adler (S.). **The Trypanocidal Effect of Phenylglycine Amido Arsenate of Sodium on *T. brucei* in Rats and *T. rhodesiense* in Mice.**— *Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 427–432.

ii. Adler (S.). **Note on Bismuth as a Trypanocide.**— *Ibid.* p. 433.

i. The drug, a white amorphous powder, is readily soluble in distilled water, and yields a clear colourless solution. On standing it becomes yellow, and sterilizing hastens the discoloration.

Freshly prepared 5 and 10 per cent. solutions were used by intraperitoneal inoculation to ascertain the M.L.D. No toxic effects were produced until the dose reached 1·2 gm. per kilo.

On standing in solution the drug becomes increasingly toxic for a time. When the solution had acquired a deep yellow tint (eleven days) the toxicity had apparently diminished.

For rats infected with *T. brucei* the minimum curative dose was found to be 0·7 gm. per kilo.

In vitro the drug has no effect upon trypanosomes, nor has the blood of treated animals 24 hours after becoming trypanosome-free.

The drug has no curative effect upon mice infected with *T. rhodesiense.*

ii. Soluble bismuth sodium tartrate was tried in solutions of various strengths with *T. rhodesiense* and *T. brucei* (nagana ferox).

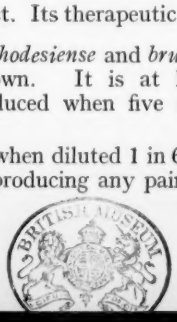
The M.L.D. for healthy mice was ·047 gm. of bismuth, and for healthy guinea-pigs ·062 gm. per kilo.

In no instance was any cure effected.

Navarro Martin (Augusto). **Sur l'emploi de l'aminophénolarsinate de soude dans le traitement des Trypanosomiases.** [The Treatment of Trypanosomiasis with Aminophenylarsenate of Soda.]— *Ann. Inst. Pasteur.* 1922. Jan. Vol. 36. No. 1. pp. 38–45.

Oxyaminophenylarsenic acid (which the author calls " 189 ") has a marked trypanocidal effect. Its therapeutic coefficient $\left(\frac{\text{curative dose}}{\text{tolerated dose}}\right)$ is higher, at least for *T. rhodesiense* and *brucei*, than that of any other arsenical compound known. It is at least one-fifth. Nervous symptoms are only produced when five or six times the curative dose is given.

The monosodium salt, when diluted 1 in 6 to 1 in 13, may be injected subcutaneously without producing any pain or swelling.



YORKE (Warrington). **The Treatment of a Case of Rhodesian Sleeping Sickness by the Preparation known as "Bayer 205."**—*Ann. Trop. Med. & Parasit.* 1921. Dec. Vol. 15. No. 4. pp. 479–482.

The patient was taken ill in September, 1920, and from that date until early in July, 1921, he was treated with various arsenic and antimony preparations without success. By this time he was in a very low condition and the case seemed hopeless.

Treatment was begun with 0·5 gm. of "Bayer 205" in 5 per cent. solution intravenously, and the fever subsided very promptly. The following day 1 gm. in 10 per cent. solution was given, and repeated on the following day. After an interval of seven days—the blood remaining free from trypanosomes—the dose of 1 gm. was repeated. No further treatment was given, and the patient appeared to make a complete recovery. His blood remained free of parasites during a period of observation of four months.

VAN SACEGHEM (René). **Le Pétrole dans le Traitement de la Fièvre récurrente et de la Trypanosomiase.** [Petroleum in the Treatment of Relapsing Fever and Trypanosomiasis.]—*Bull. Agric. Congo belge.* Sept. 1921. Vol. 12. No. 3. pp. 493–494.

The author states that a large spoonful of petroleum taken *per os* night and morning for four consecutive days has given a large number of successes among cases of relapsing fever in natives.

The treatment is useless in animal trypanosomiases.

NATTAN-LARRIER (L.). **Infections à Trypanosomes et voies de pénétration des virus.** [Trypanosome Infections and Paths of Entry of the Viruses.]—*Bull. Soc. Path. Exot.* 1921. Nov. Vol. 14. No. 9. pp. 537–542. With 2 tables.

The author has carried out some experiments regarding the course of the infection in animals inoculated in different ways with *T. equiperdum* and *Schizotrypanum cruzi*.

Mice inoculated with *T. equiperdum* intraperitoneally shewed trypanosomes after 24 hours, and died 3–5 days later. Subcutaneous inoculation of the same virus in the same dose was followed by a period of incubation of from 48–96 hours, but the period of infection was from 2–4 days.

Trypanosoma equiperdum was found to be capable of penetrating the conjunctiva in 20 per cent. of cases, and the buccal and rectal mucous membranes in 33 per cent. of cases. On the other hand when infective material was spread over an area of skin devoid of hair infection took place without fail. The period of incubation in the case of the latter method of infection was from 7–8 days. Infection *via* the cornea was followed by a period of incubation of 9 days, rectal infection by one of 10 days, and ingestion by 14 days. After intraperitoneal inoculation the period of incubation was 1–2 days. The period of illness after intraperitoneal inoculation was 14 [? 4] days, but only about half that after the other methods of infection.

ACKERMANN (J.). **Untersuchungsergebnisse über Beschälseuchevedacht in Meiringen (Kt. Bern).** [Investigation of Suspected Cases of Dourine at Meiringen, Bern Canton.]—*Schweiz. Arch. f. Tierheilk.* 1922. Jan. Vol. 64. No. 1. pp. 13–22.

A stallion developed symptoms which very closely resembled those of dourine in April, 1921, and similar symptoms were shown by a mare

covered by that animal. A very thorough investigation was carried out, but no evidence could be obtained that the animals were actually the subject of dourine.

YAKIMOFF (W. L.) & WASSILEWSKY (W. J.). **L'identification du Trypanosome des chameaux du Turkestan et de l'Oural.** [The Identity of the Camel Trypanosome in Turkestan and Ural.]—*Bull. Soc. Path. Exot.* Dec. 1921. Vol. 14. No. 10. pp. 637–638.

A sheep was infected with the camel trypanosome from Ural, and subsequently guinea-pigs were infected from the sheep. A mixture of serum from the sheep, and trypanosomes from the guinea-pigs was inoculated into three mice. A fourth mouse received trypanosomes only. None of the three receiving the mixture became infected. The control became affected. The sheep was therefore immune to the Ural trypanosome.

Using serum from the same sheep a similar experiment was carried out with camel trypanosomes from Bokhara. The result was the same. Subsequently the sheep was inoculated with trypanosomes from Turkestan. It failed to become infected and its blood did not infect a dog inoculated with it. The camel trypanosomes of Turkestan and Ural are therefore identical.

YAKIMOFF (W. L.). **À propos de l'identification du Trypanosome des chameaux du Turkestan russe.** [The Identification of the Camel Trypanosome in Russian Turkestan.]—*Bull. Soc. Path. Exot.* 1921. Dec. Vol. 14. No. 10. pp. 638–640.

The author refers to some experiments reported in Vol. 78 of the *Comptes Rendus de la Société de Biologie* in 1915, from which the following conclusions were drawn :—

1. The trypanosomes of Russian and Algerian dourine are identical.

2. The trypanosomes of donkeys in Bokhara and of camels in Russian Turkestan (of Bokhara and Samarkande origin) are identical.

3. The trypanosome of Russian dourine is not identical with the trypanosomes of donkeys and camels in Bokhara, nor with *T. brucei*.

In the present note the author records some experiments carried out by MESNIL, on his behalf, with a view to ascertaining whether the Turkestan camel trypanosome is identical with other known camel trypanosomes (*T. evansi* and *T. soudanense*).

Yakimoff sent some of the serum obtained from the sheep immunized against the camel trypanosome for the immunity tests (see abstr. above).

The sheep serum proved to be ineffective against *T. evansi* (Mauritius strain). When tested with *T. soudanense* the results indicated, in MESNIL's opinion, that there were certain resemblances between *T. soudanense* and the Bokhara trypanosome. Yakimoff believes that they are different species, because the symptoms caused in camels are not the same.

He proposes the name of *T. Ninae Kohl-Yakimov* for the Turkestan parasite.

FRANCHINI (G.). **Trypanosome de la chauve-souris en Italie. Formes viscérales et stades de développement chez un Acarien gamaside, le *Leiognathus laverani*, n. sp.** [A Trypanosome of the Bat in Italy. Visceral Forms and Developmental Phases in a Gamasid, *Leiognathus laverani*, n. sp.]—*Bull. Soc. Path. Exot.* 1921. Nov. Vol. 14. No. 9. pp. 542–546. With 2 text figs.

The trypanosome was found to be scantily present in the blood of 30 specimens of *Vesperugo pipistrellus* out of 100 caught. The parasite is small, and in stained smears is often ring-shaped (une forme annulaire). The round centrosome is quite close to the posterior end and the large oval nucleus towards the anterior end. The undulating membrane is small and shows few folds. The free part of the flagellum is sometimes very long. There appeared to be slender and stumpy forms. The range of measurements is: Length, 8·5 to 10μ; width, 1·5μ; free flagellum, 6–10μ.

The principal lesions were enlargements of the spleen and testicles, but trypanosomes were never found in the latter. Leishmaniform parasites were found in smears from the liver and lungs of three of the bats. Smears were examined from the liver, spleen, lungs, ovaries, testicles and intestine.

CHATTON and COURRIER have described the presence of multiplication forms of a trypanosome in many parts of the body of a bat of the same species captured in Alsace.

More than 50 smears, made from *Leiognathus laverani* caught on the bats, were examined for developmental forms, and in a third of the specimens examined fresh, crithidial forms and young trypanosomes in rosettes were found. Occasionally adult trypanosomes like those found in the blood were seen.

In smears from the alimentary canal of two of the ecto-parasites leishmaniform parasites and herpetomonads were found.

CAUCHEMEZ (L.). **Fréquence de la Coccidie du porc (*Eimeria brumpti*, n. sp.) en France.** [The Frequence of Coccidiosis of the Pig (*Eimeria brumpti*, n. sp.) in France.]—*Bull. Soc. Path. Exot.* 1921. Dec. Vol. 14. No. 10. pp. 645–648. With 1 text fig.

Between April 24 and May 13 the author examined faecal matter from 100 pigs, and found coccidia on 26 occasions. Further examinations showed that the number of infected pigs remained high during the summer, and that it decreased during the autumn. The oocysts found ranged from 13–30μ in length by 9–18μ in width. They were rather variable in shape, some being distinctly more rounded than others. The double contour of the envelope was distinct and the micropyle difficult to make out.

Diluted faeces which had been enriched by screening and sedimentation were placed in layers from $\frac{1}{2}$ to 1 cm. thick in petri dishes and incubated at 25° C. Wood charcoal or 1 in 500 chromic acid were added to prevent putrefaction. Round sporoblasts were visible by the third day, and these had become elongated by the sixth day. Subsequently the sporozoites and residual body could be made out, but with some difficulty.

In the absence of cross immunity tests the author has not been able to decide whether the parasite of the pig is identical with that of cattle or not.

A ten-weeks-old pig, whose faeces had been examined with negative results for about three weeks, was fed with mature oocysts. The first oocysts were found in small numbers in the faeces on the seventh day. They increased somewhat in numbers up to the twelfth day and then became more scanty.

The author has not been able to detect naked-eye lesions in any of the pigs whose faeces contained the parasite nor have sections been obtained showing the parasite *in situ* in the tissues.

Pigs whose faeces contained large numbers of parasites were perfectly healthy in appearance. The infestation appeared to be a benign one.

YAKIMOFF (W. L.). **Les Protozoaires des animaux domestiques en Transcaucasie.** [The Protozoa of Domesticated Animals in Transcaucasia.]—*Bull. Soc. Path. Exot.* 1921. Dec. Vol. 14. No. 10. p. 652.

In 1915 the author examined the blood of 50 cattle, 35 horses and 20 dogs in the Transcaucasus.

In the cattle *P. bigeminum* was found once, *Sarcocystis blanchardi* 10 times, and *T. theileri* once. Theileria was not encountered. Neither microfilariae nor intracorpuscular parasites were found in the horses and dogs.

PARROT (L.). **Recherches sur l'étiologie du Bouton d'Orient (Clou de Biskra). Études sur la biologie de Phlebotomes en milieu endémique.** [The Etiology of Oriental Boil. The Biology of the Phlebotomus in an Endemic Area.]—*Bull. Soc. Path. Exot.* 1922. Jan. Vol. 15. No. 1. pp. 79–92.

The author found that only two species of Phlebotomus occur at Biskra, namely, *P. papatasii* and *P. minutus* var. *africanus*. It was suspected, and subsequently established, that the former is responsible for the transmission of the infection.

SAZERAC (R.) & LEVADITI (C.). **Étude de l'action thérapeutique du Bismuth sur la Syphilis.** [The Therapeutic Action of Bismuth in Syphilis.]—*Ann. Inst. Pasteur.* 1922. Jan. Vol. 36. No. 1. pp. 1–13.

The authors state that their experiments show that bismuth possesses remarkable spirillicidal properties, and that its action in both man and animals is comparable to that of the best antisyphilitic drugs known. It appears to be better than mercury, but is slower in action than the most active arsenical compounds.

They have tested a number of compounds with a view to detecting any relationship between their activity and their chemical composition. "Tartrobismuthate" is specially active, and is of comparatively simple composition.

They hope to be able to test the value of bismuth compounds analogous to certain arsenobenzene compounds, but with the arsenic replaced by bismuth.

FOURNIER (L.) & GUÉNOT (L.). **Traitement de la syphilis par le bismuth.** [The Treatment of Syphilis by Bismuth.]—*Ann. Inst. Pasteur.* 1922. Jan. Vol. 36. No. 1. pp. 14–33.

Bismuth has been used for intramuscular injections in doses of 20–30 cgm. repeated 10–12 times within a month. No evidence of toxicity has been obtained and no ill-effects produced.

The objections to the treatment are :—

1. Evidences of reaction at the seat of puncture.

2. Practically constant impregnation of the buccal mucous membrane, as evidenced by black plaques, blueness of the tongue, and even slight stomatitis.

Bismuth exercises a rapid and prolonged action against syphilis, and particularly against the contagious forms.

On the other hand it produces a marked reduction, or even causes the complete disappearance, of the serum reaction.

It remains to be seen whether total and permanent cures of cases of syphilis can be effected by means of bismuth.

FOURNIER (L.), GUÉNOT (L.) & SCHWARTZ (A.). **Premiers résultats du traitement de la syphilis par l'acide oxyaminophenylarsinique (sel de soude), or " 189."** [The First Results of the Treatment of Syphilis by the Sodium Salt of Oxyaminophenylarsenic Acid, or " 189."]—*Ann. Inst. Pasteur.* 1922. Jan. Vol. 36. No. 1. pp. 53–62.

The authors conclude that the drug exerts a powerful antisyphilic action and causes the rapid disappearance of primary and secondary lesions. In rare instances a relapse follows the first series of injections.

Its action upon complement fixation is slow and as a rule is obvious after the second series of injections only, when complement fixation may be weak or negative.

" 189 " has not been responsible for any serious local or general ill-effects.

LEVADITI (C.) & NAVARRO-MARTIN (A.). **Action thérapeutique de l'acide oxyaminophénylarsinique dans la Spirillose des poules et la syphilis expérimentale du lapin.** [The Effect of Oxyaminophenylarsenic Acid in Fowl Spirillosis and Experimental Syphilis in the Rabbit.]—*Ann. Inst. Pasteur.* 1922. Jan. Vol. 36. No. 1. pp. 46–52.

The authors' experiments have been carried out with the acid itself, its sodium salt, its acetyl derivative and the calcium salt of the latter, and they come to the conclusion that EHRLICH and HATA's view that the arsenic acids cannot be used without ill-effects in the treatment of trypanosomiases and spirilloses is not justifiable.

The curative doses of the above compounds are higher than that of " 606," the therapeutic coefficient being $\frac{1}{4}$ as compared with $\frac{1}{8}$. It is possible that this is due to the more rapid elimination of the drugs. This defect is counterbalanced by the fact that " 189 " can be injected subcutaneously and acts promptly.

CHAMBERS (F.). **Piroplasmosis of the Reindeer.**— *Vet. Jl.* 1921. Nov. Vol. 77. No. 11. pp. 415–419.

DIXON (R. W.). **East Coast Fever.—Its Prevention and Eradication.**— *Union of S. Africa. Jl. Dept. Agric.* 1921. Nov. Vol. 3. No. 5. pp. 436–445.

FRANCHINI (G.). **Sur les flagellés intestinaux du type Herpetomonas du *Chamaeleon vulgaris* et leur culture, et sur les flagellés du type Herpetomonas de *Chalcides* (*Gongylus*) *ocellatus* et *Tarentola mauritanica*.** [The Intestinal Flagellates of the Herpetomonas Type of *Chamæleon vulgaris* and of *Chalcides ocellatus* and *Tarentola mauritanica*.]—*Bull. Soc. Path. Exot.* 1921. Dec. Vol. 14. No. 10. pp. 641–645.

DE GASPARI (F.). **Morbo coitale maligno e anafilassi. Alcune ricerche sperimentali sulla sensibilizzazione delle'organismo animale con i prodotti tossici dei tripanosomi e con le sensibilisine di cui quelli provocano la formazione.** [Dourine and Anaphylaxia. Experiments regarding the Sensitization of Animals with Toxic Products of Trypanosomes and the Sensibilizine to which they give rise.]—*Clin. Vet.* 1921. Sept. 15. Vol. 44. No. 17. pp. 471–487.

LANFRANCHI (A.) & SANI (L.). **L'intrapalpebro-reazione nella diagnosi del morbo coitale maligno.** [The Intra-palpebral Reaction in the Diagnosis of Dourine.]—*Clin. Vet.* 1921. Nov. 15–30. Vol. 44. Nos. 21–22. pp. 647–650.

LAVIER (G.). **Hémogrégarines, Grahamella, Spirochète et Trypanosome du campagnol indigène *Microtus arvalis* Pallas.** [Haemogregarines, Grahamella, Spirochaeta and Trypanosome of the Field Mouse.]—*Bull. Soc. Path. Exot.* 1921. Nov. Vol. 14. No. 9. pp. 569–576. With 5 text figs.

NOYER (E.). **Über Beschälseuche.** [Dourine.]—*Schw. Arch. f. Tierheilk.* 1921. Nov. Vol. 63. No. 11. pp. 451–466.

PRICOLO (A.). **Terza nota sulla piroplasmosi da *Theileria parva* nell'Africa del Nord.** [Third Note on the Occurrence of *Theileria parva* in North Africa.]—*Clin. Vet.* 1921. Sept. 30. Vol. 44. No. 18. pp. 503–512.

SANI (L.). **Il morbo coitale maligno in Italia ed i diversi metodi di diagnosi sperimentale.** [Dourine in Italy and the Various Methods employed for Diagnosis.]—*Clin. Vet.* 1922. Feb. 16 & 28. Vol. 45. No. 3. pp. 87–94 (to be continued).

TROUT (C. L.). **Treatment of Trypanosomiasis by Various Methods.**—*Jl. Trop. Med. & Hygiene.* 1921. Dec. 15. Vol. 24. No. 24. pp. 321–322.

YAKIMOFF (W. L.), WASSILEWSKY (W. J.), KORNILOFF (M. T.) & ZWEITKOFF (N. A.). **Flagellés de l'intestin des animaux de laboratoire.** [Intestinal Flagellates of Laboratory Animals.]—*Bull. Soc. Path. Exot.* 1921. Nov. Vol. 14. No. 9. pp. 558–564. With 1 text fig.

DISEASES DUE TO METAZOAN PARASITES.

MAURIAC (P.) & BOYER (R.). **Recherches expérimentales sur le traitement de la distomatose par les injections intraveneuses d'émétique.** [Experimental Investigations of the Treatment of Distomatosis by Intravenous Injections of Emetic.]—*C.R. Soc. Biol.* 1921. Nov. Vol. 85. No. 33. pp. 917–919.

Four sheep, in the faeces of which the eggs of the large and small fluke and of a strongyle were discoverable, were selected for experiment. A 4 per cent. solution of emetic was given intravenously.

The first animal received a total quantity of 0·86 gm. within a period of 16 days. Progressive doses ranging from 1–12 cgm. were given daily. There was no systemic disturbance of any kind. The animal was killed at the end of the period. The liver was markedly cirrhotic and 56 absolutely unaffected large flukes and large numbers of small ones were found.

It was found that doses of emetic which were sufficiently large to produce marked toxic symptoms in the two other sheep—they received total amounts of 2·16 gm. and 3·71 gm. respectively—failed to exercise any effect upon the flukes.

Emphasis is laid upon the necessity of making frequent and prolonged examinations of the faeces for eggs in experiments of this kind, in order to avoid inaccurate deductions.

BOUIN. **Filariose et microfilariose des animaux domestiques dans le sud Morocain.** [Filariasis and Microfilariasis of the Domesticated Animals in Southern Morocco.]—*Rec. Méd. Vét.* 1921. Nov.–Dec. Vol. 97. No. 22–24. pp. 464–467

No new species are described in this paper, the author's aim being mainly to record the occurrence of certain species. They are as follows :—

1. In the dog—
   a. *Filaria immitis.*
   b. *Acanthocheilonema dracunculoides.*
2. In the dromedary—
   a. *Filaria evansi.*
3. In the ox—
   a. *Filaria labiato-papillosa.*

GEDOELST (L.). **Quelques nématodes parasites de l'elephant africain.** [Some Nematode Parasites of the African Elephant.]—*Bull. Soc. Path. Exot.* 1922. Feb. Vol. 15. No. 2. pp. 122–127.

The author has found three species of worms in faeces from an African elephant at Api, only one of which is new.

The two known species were *Amira pileata,* and *Murshidia recta.*

The third is provisionally placed in the genus *Ascaridia* (Railliet and Henry) which up to the present comprises only parasites obtained from birds, but which LANE holds will have to be sub-divided.

The main features are as follows. The body is tapered at both ends and shews pronounced transverse striations. The mouth is terminal and triangular. The dorsal lip has two large papillae, and the sub-ventral lips one each. The males and females are not markedly different in length (about 24 mm.). The author has had only one male worm for examination. The caudal extremity has poorly developed lateral wings. The genital papillae are large and there are nine pairs. The spicules are practically equal in length (3·5 mm.). The genital tube makes many convolutions around the intestine.

Female.—The lips of the vulva are not prominent, and the orifice is posterior to the midpoint of the body. The ovijector is directed forwards and from it two divergent uteri arise. These pass forwards and backwards, the one to within 2·8 mm. of the oesophagus and the other to within the same distance of the anus.

The eggs measure 80 by 48μ.

SCHWARTZ (B.). **Hemotoxins from Parasitic Worms.**—*Jl. Agric. Res.* 1921. Nov. 19. Vol. 22. No. 8. pp. 379–432.

Apart from the importance of the author's experimental work described in this paper, the publication has an added value in that it contains a full account of the previous contributions, which are succinctly summarized, and a full list of references.

It would appear that the following points have hitherto been established :—

" 1. Certain parasitic worms secrete substances that affect the blood of the host deleteriously. These substances, which may be designated as hemotoxins, are in general nonspecific in that they are also active toward blood of animals other than their normal host.

" 2. *Diphyllobothrium latum*, a tapeworm which is known to cause severe anaemia, contains a hemolytic agent. It appears questionable that this agent is oleic acid, as claimed by FAUST.

" 3. Concerning hemolysins in cestodes other than *Diphyllobothrium latum* no definite conclusions can be drawn from the literature on the subject, but that hemolysins are present in several species appears probable.

" 4. *Schistosoma japonicum* secretes an ether-soluble hemolysin.

" 5. Hookworms (Ancylostoma and Necator) secrete a hemolysin and an anticoagulin.

" 6. Whipworms (*Trichuris trichiura*) apparently secrete a hemolysin.

" 7. Worms belonging to the genus Ascaris contain a hemolysin which is closely bound to the tissues of the worms and is therefore but slightly soluble in water, which fact accounts for the negative results obtained by certain investigators. These parasites also appear to secrete a feeble anticoagulin.

" 8. Worms of the genus Strongylus secrete a hemolysin and an anticoagulin. The hemolytic principle of these parasites is apparently an alkaloid, although other substances found in them show hemolytic power.

" 9. *Haemonchus contortus* apparently secretes a weak hemolysin.

" 10. Extracts of *Macracanthorhynchus hirudinaceus* are apparently destructive to erythrocytes.

" 11. Hemolytic and anticoagulating properties are found in extracts of species of Gastrophilus.

" 12. Hemolytic substances from parasites are soluble in alcohol and ether, thus resembling lipoids.

" 13. With respect to their resistance to heat, hemolysins from animal parasites vary, but in general they are thermostable."

Summary of the results obtained in the present investigation :—

" Extracts of *Ascaris lumbricoides* contain active substances that affect blood deleteriously. The hemolysin which these abstracts contain is a thermostable, nonspecific, alcohol-soluble substance which appears to be rather firmly bound to the cells of the parasite, presumably to the cells of the intestine in which it is elaborated. The hemolytic potency of extracts of *A. lumbricoides* is not due solely to fatty acids, since chemical fractions of the worms from which the fatty acids have been removed by ether extraction are hemolytic. The hemolysin is neutralized by normal blood serum.

" The body fluid of *A. lumbricoides* shortly after removal from the host contains oxyhemoglobin and is nonhemolytic. It acquires hemolytic powers, however, as the worms are kept alive in vitro for a few days, and loses at the same time its oxyhemoglobin content.

" Body fluid from fresh specimens of *Ascaris lumbricoides* does not activate a hemolytic system, and alcohol-soluble fractions of the worms from which ether-soluble substances have been removed does not act as complement in combination with inactivated normal guinea-pig serum.

" The hemagglutinin from *Ascaris lumbricoides* is a salt-solution-soluble substance and has special affinities for rabbit blood cells. Unlike the hemolysin, its action is not hindered by low temperatures (6° to 8° C.).

" *Ascaris lumbricoides* secretes a substance that inhibits the coagulation of blood. This substance is present in the body fluid of the worm, and has but a comparatively slight potency.

" *Ancylostoma caninum* secretes a nonspecific hemolysin, soluble in salt-solution, relatively thermolabile and inactive at low temperatures. Normal blood serum inhibits the action of hookworm hemolysin.

" *Bustomum* [? *Bunostomum*], *phlebotomum* secretes a hemolysin having properties similar to that of *Ancylostoma caninum*. This hemolysin is completely soluble in alcohol.

" Salt-solution extracts of *Haemonchus contortus* have but a feeble hemolytic action.

" Salt-solution extracts of *Ancylostoma caninum* and of *Bustomum phlebotomum* do not inhibit the coagulation of rabbit blood to any marked degree.

" A weak hemolytic substance is present in abstracts of *Trichuris depressiuscula*.

" *Thysanosoma actinoides* contains an alcohol-soluble hemolysin. Alcohol-soluble fractions of *T. actinoides* from which the ether-soluble fraction has been removed are hemolytic, showing that substances other than fatty acids are removed. The hemolysin from this cestode is active at 8° C. and is neutralized by normal blood serum.

" Extracts of a species of Moniezia similar to those of *Thysanosoma actinoides* are non-hemolytic."

VIALATTE (Ch.) & PARROT (L.). **Phlébotomes du Maroc.** [Phlebotomus in Morocco.]—*Bull. Soc. Path. Exot.* 1921. Nov. Vol. 14. No. 9. p. 566.

The authors point out that apart from the single reference to the subject by DELANOË (1915) nothing is known regarding the distribution of Phlebotomus in Morocco. They now record the occurrence of *P. papatasii*, *P. perniciosus* (*Sergentomyia perniciosa*), *P. minutus* var. *africanus*.

CURASSON (G.). **La gale chorioptique du bœuf au Sénégal et au Soudan.** [Chorioptic Mange of the Ox in Senegal and the Sudan.]—*Rec. Méd. Vét.* 1922. Jan. 15. Vol. 98. No. 1. pp. 14–19.

The disease appears after the rains, that is in November and December. Although the animals seen by the author were affected almost all over their bodies, the oldest looking and therefore probably the original seats of the lesion were at the root of the tail and the croup. Pruritus appeared to be very slight, and such lesions as were present were due to the irritation of the parasite itself and not to rubbing. The affection spreads with remarkable rapidity over the body. The disease yields rapidly to treatment. Ointments are to be avoided as the sun causes them to blister the skin. The native treatment, of which the author has a good opinion, comprises washing with urine, which has undergone ammoniacal fermentation, to clean the surface of the skin and then using a decoction of the astringent bark of the baobab tree, tobacco leaves and indigo. Simple washing with native soap followed by water containing cresyl has given good results. Old standings should be abandoned and fresh places made, one for the diseased and a larger one for the healthy.

The disease does not spread naturally to other animals, but the horse can be infected experimentally. In the horse the condition is of brief duration. Attempts to infect sheep and goats were all, with one possible exception, failures.

BLACKLOCK (B.). **Notes on an Apparatus for the Individual Breeding of Mosquitoes.** —*Ann. Trop. Med. & Parasit.* 1921. Dec. Vol. 15. No. 4. pp. 473–477. With 5 text figs.

CAWSTON (F. G.). **Three Schistosomes in Natal which possibly attack Man.**— *Jl. Trop. Med. & Hyg.* Sept. 15. 1921. Vol. 24. No. 18. pp. 242–244. With 2 text figs.

CAWSTON (F. G.). **The Treatment of Fluke Diseases.**—*Jl. Trop. Med. & Hyg.* Oct. 1. 1921. Vol. 24. No. 19. pp. 254–255.

CAWSTON (F. G.). **A Series of Cases of Bilharzia Disease treated with Tartar Emetic.**— *Jl. Trop. Med. & Hyg.* Oct. 15. 1921. Vol. 24. No. 20. pp. 267–268.

CAWSTON (F. G.). **Bilharzia Infection in the Pool, the River, and the Lagoon.**— *Jl. Trop. Med. & Hyg.* 1922. Jan. 16. Vol. 25. No. 2. pp. 16–18.

DAVEY (J. B.) & NEWSTEAD (R.). **Mosquitoes and other Blood-Sucking Arthropods of the Upper Shiré River, Nyasaland.**— *Ann. Trop. Med. & Parasit.* 1921. Dec. Vol. 15. No. 4. pp. 457–463.

DESCAZEAUX (J.). **Traitement de l'habronémose cutanée.** [The Treatment of Cutaneous Habronemosis.]—*Rec. Méd. Vét.* 1921. Nov.–Dec. Vol. 107. No. 22–24. pp. 489–492.

GHESQUIÈRE (J.). **Rapports de l'entomologiste. Laboratoire d'entomologie d'Eala. No. 6. Note sur quelques parasites des oiseaux de basse-cour au Congo belge.** [Reports of the Entomologist, Entomological Laboratory, Eala. No. 6. Some Parasites of Poultry in the Belgian Congo.]—*Bull. Agric. Congo belge.* 1921. Dec. Vol. 12. No. 4. pp. 727–730.

IHLE (I. E. W.). **On the Genus Cylicostomum.**— *Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 397–402. With 3 text figs.

JOHNSTON (T. H.). **The Nodule Parasite and Allied Worms from Queensland Cattle.**— *Queensland Agric. Jl.* Sept. 1921. Vol. 16. No. 3. pp. 172–174.

MAPLESTONE (P. A.). **Notes on Australian Cestodes.**— *Ann. Trop. Med. & Parasit.* 1921. Dec. 30. Vol. 15. No. 4. pp. 397–412. With 5 text figs.

MONNIER (A.). **À propos de l'habronemose cutanée.** [Cutaneous Habronemosis.] —*Rec. Méd. Vét.* 1921. Nov.–Dec. Vol. 107. No. 22–24. pp. 459–464.

SCHWETZ (J.). **La présence de pupes de *Glossina palpalis* à 1,500 m. de l'eau.** [The Presence of Pupae of *Glossina palpalis* at a Distance of 1,500 metres from Water.]—*Bull. Soc. Path. Exot.* 1922. Jan. Vol. 15. No. 1. pp. 23–25.

SOPARKAR (M. B.). **The Cercaria of *Schistosomum spindalis* (Montgomery).**— *Indian Jl. Med. Res.* 1921. July. Vol. 9. No. 1. pp. 1–22. With 2 plates.

SOPARKAR (M. B.). **Notes on some Furcocercous Cercariae from Bombay.**— *Indian Jl. Med. Res.* 1921. July. Vol. 9. No. 1. pp. 23–32. With 6 plates.

TRAVASSOS (L.). **Contribuições para o con hecimento da fauna helmintolojica brasileira. XII. Sobre as Especies Brasileiras da sub-familia Brachycoelinae.** [Brazilian Helminths. (Brazilian species of the sub-family Brachycoelinae).] —*Archiv da Escola superior de Agric. e Med. Vet.* 1921. Sept. Vol. 5. Nos. 1 & 2. pp. 59–68. With 3 plates.

BACTERIAL DISEASES.

BROCQ-ROUSSEU, FORGEOT (P.) & URBAIN (A.). **Sur la formation des anticorps à la suite des Injections de Malléine.** [The Formation of Antibodies following Injections of Mallein.]— *Ann. Inst. Pasteur.* 1921. Dec. Vol. 35. No. 12. pp. 879–892.

All investigators have found that mallein injections are superior to such methods as agglutination, complement-fixation, etc. But it is admitted that the latter methods are valuable in some instances in which the results yielded by mallein are doubtful.

In view of this fact it is of importance to ascertain whether injections of mallein influence the antibody content of the serum.

A number of tests were carried out with this object in view.

Conclusions.

1. The intradermal injection of 0·1 cc. of "Malléine au quart" [crude mallein made up to 4 volumes.—A.L.S.] repeated four times at regular intervals caused the appearance of antibodies in 2 cases out of 5, a proportion of 40 per cent.

2. A first subcutaneous injection of 2·5 cc. of "Malléine au dixième" [*i.e.*, dilute mallein.—A. L. S.] causes the appearance of sensitizer in the blood in 4 out of 5 horses, *i.e.*, 80 per cent. After a second injection antibodies are constantly present.

3. Horses, which show no antibodies after four successive palpebral injections of mallein, show them four days after a subcutaneous injection. They receive in fact in this case a dose of crude mallein ten times as big as that given in the first injections.

4. The antibodies formed either after an intradermal test or after a subcutaneous test appear from the fourth to the eighth day after the injection. They always disappear after the forty-fifth day.

5. In glandered animals the richness of the serum in antibodies is markedly increased by an injection of mallein.

The practical conclusion to be drawn from the work is that if it is desired to combine the complement-fixation test with a mallein test for the diagnosis of glanders, the blood must be taken immediately after the injection of the mallein, and in any case before the fourth day or after the forty-fifth day.

The blood should, of course, be taken prior to the test, but as complement-fixation is usually necessary in cases of doubtful results the blood is as a rule taken on the day following the test.

HOSKINS (H. P.). **The Occurrence of Virulent and Non-virulent Strains of the Hemorrhagic Septicaemic Organism in the same Animal.**—*Jl. Amer. Vet. Med. Assoc.* 1922. Jan. Vol. 60. No. 4. pp. 453–460.

The investigations recorded in this paper were carried out with materials derived from the lungs and muscles of calves dead of the pulmonary form of haemorrhagic septicaemia (stockyard pneumonia). From the lung and muscle by direct culture, and from the muscle by rabbit passage three cultures, all apparently the same and corresponding with *Bacterium bovisepticum*, were obtained. It was observed that the broth cultures of the strain isolated direct from the muscle were heavier and did not clear up as did the lung strain, but no particular attention was paid to this at the time, as similar differences had been observed at other times when a single strain was grown in different batches of media. An emulsion of lung tissue failed to kill a rabbit; the question as to the virulence of the lung strain therefore arose.

Rabbits inoculated with both cultures of the lung strain failed to die, nor did repeated inoculations produce any immunity. Rabbits inoculated with the muscle strains, whether isolated direct or through rabbits, died.

The conclusion drawn by the author from these results is indicated by the title of the paper.

Non-virulent organisms of the haemorrhagic septicaemia type have been isolated by the author from the air passages of a number of animals, but this is the first instance in which the author has obtained virulent and non-virulent forms from the same animal.

In this case cultures were not made from the blood.

D'HÉRELLE (F.) & LE LOUET (G.). **Sur la vaccination antibarbonique par virus atténué.** [Antibarbone Vaccination with Attenuated Virus.]—*Ann. Inst. Pasteur.* 1921. Nov. Vol. 35. No. 11. pp. 741–744.

The authors had at their disposal two strains of barbone cultures. One of these was in the blood of a rabbit which had died after inoculation, the blood having been preserved in sealed ampoules for sixteen months. The other was a Martin's broth culture of the same rabbit preserved in ampoules. Four young bulls and four buffaloes inoculated with 1 cc. of an eighteen-hours culture made from the preserved rabbit blood failed to show any reaction save for a slight rise of temperature in two of them. All these animals together with two bulls and one buffalo as controls were subsequently inoculated with a virulent culture at intervals of from 13–25 days. None showed any reaction except the controls, all of which died within 24 hours.

It is noted that the immunity was established although the animals showed no evidence of reaction.

The authors believe that passage through rabbits was responsible for the attenuation, a view which is supported by the fact that an Indo-Chinese strain which proved fatal in a dose of $\frac{1}{5000}$ cc. failed to kill in a dose of $\frac{1}{50}$ cc. after eight passages through rabbits. This dose, although it failed even to produce any reaction, conferred immunity. In order to verify the effect of cultures preserved in ampoules the remainder of the culture used for the four buffaloes referred to above was divided up and sealed in ampoules. Sixteen days later two bulls were inoculated with 1 and 0·5 cc. respectively. The former died in 24 hours and the latter in 39 hours. It therefore appeared that a fresh culture in beef broth failed to produce a reaction but conferred immunity, while the same culture after an interval produced a fatal effect. The result was the same when the conditions of the experiment were varied.

On the assumption that an attenuated organism remains attenuated if it is preserved in rabbit's blood the authors desired to ascertain whether the nature of the culture medium would affect the result of inoculation.

The experiments designed to elucidate this point showed that a beef broth culture of an attenuated strain caused fatal infection, although the culture may be recent. On the other hand the inoculation only confers immunity when the attenuated organism is cultivated in a medium prepared from rabbit flesh, even if the cultures are old. Anti-barbone cultures for immunizing purposes should therefore be made in broth prepared from rabbits.

BEVAN (L. E. W.). **Infectious Abortion of Cattle and its possible relation to Human Health.**—*Rhodesia Agric. Jl.* 1921. Dec. Vol. 18. No. 6. pp. 582–592.

" Conclusions :—

" 1. The disease known as infectious abortion of cattle which exists in Southern Rhodesia, is caused by the *Bacillus abortus*, Bang, and

serological tests indicate that it is identical with the specific abortion of cattle in other parts of the world.

" 2. The *Bacillus abortus* of Bang bears a close morphological and biological resemblance to the *Micrococcus melitensis*. Serological tests also indicate a close affinity, in that certain strains of *M. melitensis* can be agglutinated with serum from cattle infected with infectious abortion, and strains of *B. abortus* can be agglutinated by serum from patients suffering from undulant fever.

" 3. The characteristic symptom of undulant fever in goats and sheep is abortion.

" 4. Certain cases presenting symptoms resembling undulant fever have occurred in Southern Rhodesia in men who, so far as is known, have not obtained infection from goats, but have resided on farms where animals are or have been infected with infectious abortion.

" 5. It is suggested that these cases are suffering from an infection caused by the *Bacillus abortus* of cattle.

" 6. It is also suggested that human females may contract infectious abortion through the ingestion of the organism in milk and dairy products from infected cows.

" 7. Although infectious abortion is prevalent in other parts of the world where goat's milk is not used for human consumption, it has not been accused of causing the symptoms of undulant fever in man nor has it been proved to cause abortion in human subjects.

" 8. Although infectious abortion has prevailed in the Marandellas district for many years, it is only within the last few months that cases resembling undulant fever in man have been recorded.

" 9. While circumstantial evidence points to the infection of man by the *Bacillus abortus* of Bang, and scientific tests up to a point support this suspicion, the final proof is not yet available.

" 10. If infectious abortion of cattle is essentially a bovine disease, a grave responsibility attaches to the Veterinary Department ; and if this disease is communicable to man, a hearty co-operation between the medical and veterinary professions is necessary in dealing with it."

VAN SACEGHEM (René). **La Pneumonie contagiense des Chèvres au Ruanda.** [Contagious Pneumonia of Goats.]—*Bull. Agric. Congo belge.* 1921. Sept. Vol. 12. No. 3. pp. 502–505.

The disease is very contagious and is sometimes associated with enteritis. Infection is by ingestion. Native sheep are immune. Acute and chronic cases are seen. The symptoms are those of pleuro-pneumonia, with some degree of paralysis before death occurs.

The author has been able to isolate a gram-negative, motile cocco-bacillus, with which he has been able to reproduce the disease. On agar at 22° C. a thin varnish-like growth develops. On gelatin transparent colonies are formed which become opaque and viscous. On potato a thick coffee-coloured layer is formed. In broth there is uniform turbidity, and glucose is fermented. Milk is not coagulated.

The organism is said to possess all the characters of Paratyphoid B. Virulence decreases with the age of cultures, but cultures remain viable for months. The course of the disease produced by inoculation varies with the method employed. Intravenous inoculation produces death within a few hours, while the subcutaneous injection of culture produces chronic pneumonia.

ALLEN (H.). **An Atypical Outbreak of Haemorrhagic Septicaemia.**— *Vet. Jl.* 1922. Feb. Vol. 78. No. 2. pp. 56–58.

MASINI (G.). **Contributo allo studio degli insuccessi e degli accidenti vaccinali nella profilassi del carbonchio ematico.** [Contribution to the Study of the Failures and Accidents in Preventive Inoculation against Anthrax.]—*La Clin. Vet.* 1921. Dec. Vol. 45. Nos. 23–24. pp. 671–676.

MOSCOSO (L. E.). **Un nuevo y facil medio de cultivo del bacilo de Bang. Su empleo para la producción de vacuna.** [A New and Easy Medium for the Cultivation of Bang's Bacillus. Its Use for the Production of Vaccine.] —*Revista de Hyg. y Sanid. Pecuarias.* 1921. July. Vol. 11. No. 7. pp. 375–378.

RAVENNA (E.). **Immunizzazione e Terapia del Carbonchio sintomatico sperimentale.** [Immunization and Therapeutics in Experimental Blackquarter. —*La Clin. Vet.* 1921. Oct. 31. Vol. 44. No. 20. pp. 573–582.

RONCA (V.). **Ricerche ematologiche nel carbonchio sintomatico sperimentale.** [Blood Examinations in Experimental Blackquarter.]—*La Clin. Vet.* 1921. Dec. Vol. 44. Nos. 23–24. pp. 676–694.

DISEASES DUE TO FILTERABLE VIRUSES.

THEILER (Arnold). **African Horse Sickness** (*Pestis Equorum*). **Peresiekte or Paardenziekte (Dutch), Pferdesterbe (German), La peste du cheval (French), La peste equina (Italian).**—*Union of South Africa, Department of Agriculture. Science Bulletin.* No. 19. Pretoria : Govt. Printing & Stationery Office. 1921. (Price 3d.).

In this bulletin, which comprises some 30 pages, the author gives a summary of the present state of knowledge regarding African horse sickness.

In the opening section the history and geographical distribution of the disease are dealt with. It would appear that it has been known for more than 300 years, and that references to it can be found in official documents which are 200 years old. Between 1780 and 1854 severe visitations of the disease were experienced at intervals of about 20 years. In the last-named year the mortality was 40 per cent. of the total number (161,000) in the Colony. The disease since that date has been found to occur in many parts of the African Continent. So far as is known at present it is only Western and Central Western Africa from the Congo to the Mediterranean that are free from the disease. It has been reported in Southern Arabia, but it is not certain that it actually exists east of the Red Sea. It is not now known in the extreme south of the continent as it was in the past, and Basutoland and large areas in the Free State are not horse sickness areas. It is rarely found on high veldt, and the permanent home of the disease appears to be the low-lying coastal belt on the south-east and east.

In most parts the disease has a seasonal distribution. It makes its appearance during the summer months, increases during the autumn, and comes to a sudden stop with the first frost (April–May). It is a common experience that horses may be turned out to grass with safety nine days after the first frost. Horse sickness makes its appearance in districts outside the low-lying areas only when the rainfall is exceptionally heavy and when the rains are succeeded by warm weather.

Horses and mules running free day and night are most severely attacked. Those kraaled or stabled at night escape infection more or less in proportion to the quality of the shelter provided. The value of insect-proof stables has been established for years. The period

between sunset and sunrise is the most dangerous one. The cause of the disease is a filterable virus which is present in the blood and serum of an infected animal. The virus can be transmitted by inoculation. It cannot be separated from the corpuscles by washing, and cannot be sedimented from the serum.

Horses, mules and donkeys are susceptible. Mortality among the first of these amounts to about 95 per cent. Only a proportion of donkeys are susceptible, and in this species infection produces only a rise of temperature. No death has been recorded. The susceptibility of mules is rather less than that of horses.

The dog is susceptible by inoculation or ingestion. Young angora goats have been infected—a rise of temperature being the only symptom. A peculiar observation was made with goats. The virus after passing through the goats was infective for dogs, but the virus from these was non-infective for the horse. Viruses vary in virulence. Some produce a rapidly fatal result when ·0001 cc. of blood is injected. Others may fail to infect when a dose of 1 cc. is used. Viruses lose virulence with age, and weak viruses quicker than strong ones. Blood may remain infective although putrid, but certain bacteria which are responsible for putrefactive changes, and which have not as yet been studied, are destructive to the virus. The virus loses vitality at 50° C. It is not destroyed by 3 per cent. carbolic acid, 10 per cent. sodium taurocholate, or 10 per cent. saponin. A virus mixed with a 5–10 per cent. solution of lecithin fails to infect, but becomes virulent again when the two are separated. Drying at ordinary temperature destroys the virus.

Horse sickness appears under climatic conditions identical with those favouring the development of malaria in man, but horse sickness can spread over a wider area and to greater altitudes than human malaria. These facts, coupled with the value of insect-proof stables, strongly indicate that the disease is insect-transmitted, but no insect has, as yet, been incriminated. The evidence appears to indicate that the transmitting agent may be found among the Culicinae (viz., Ochlerotatus), and that the infection is passed on through the egg to the succeeding generation.

The reservoir of the virus has not been traced, but it is known that the blood of inoculated horses may remain infective for periods up to three months after inoculation. There is reason, however, to suspect that a non-equine reservoir may exist.

Three forms of horse sickness may be recognized clinically: (1) the pulmonary form, (2) the oedematous or cardiac form, and (3) a combination of the two. The pulmonary form corresponds with that recognized clinically as dunkop, while the oedematous form is the dikkop type.

In the pulmonary form the thoracic organs and glands are saturated with a greenish yellow clear exudate, and the lungs are fully inflated. The pleural cavity contains a variable amount of clean fluid, up to several litres. The trachea and bronchi are filled with froth. Ecchymoses are present under the epi- and endo-cardium.

There is usually a viscid mucous deposit in the fundus and pylorus of the stomach, and the mucous membrane may show diffuse or patchy reddening. This may amount to actual extravasation. The spleen is generally normal, but may be slightly enlarged.

In the dikkop type of disease the striking lesions are in the subcutaneous fatty tissue in the temporal fossae, over the masseters, the

mandibular space and the parotid region. In these areas the tissue is swollen and oedematous. Similar conditions may be found in and between the muscles of the neck. The mucous membrane of the mouth and tongue may be bluish, and the tongue itself infiltrated with exudate. The epicardium and endocardium may show extensive or patchy extravasations. The mixed forms of the disease in which pulmonary and cardiac lesions are found form the minority.

In addition to the three forms described above a fourth—the horse sickness fever form—can be recognized. This is the most difficult form to diagnose, as there are no pathognomonic symptoms. But the general course of the fever is characteristic. It is of the remittent type with morning remissions and evening exacerbations. The period of incubation and duration of the fever vary with the virulence of the virus and the susceptibility of the animal.

Clinically the pulmonary form of the disease is the most acute. The period of incubation is from two to five days (after experimental inoculation with a strong virus). The temperature curve is typical of the disease and the animal dies when the temperature has reached its height. All the symptoms of respiratory distress are present. Then coughing begins, and this amounts in some cases to actual fits of coughing. The cough is at first dry, but subsequently moist and gurgling, and an increasing escape of frothy discharge occurs after the attacks. Sometimes animals die without having ejected any froth, but it is always found around the nostrils after death.

The oedematous form of the disease " dikkop " is usually seen after the injection of weak viruses, and in animals whose immunity breaks down under natural infection.

As in the dunkop form of the disease the period of incubation and the duration of the disease vary with the strength of the virus. The symptoms which characterize the condition appear after the typical horse sickness fever has passed its maximum (*i.e.*, 14–15 days after inoculation in experimental cases). If they appear before that a fatal termination is certain.

The mixed form is rare and usually develops in an animal showing either the pulmonary or the cardiac form to a slight extent In slight pulmonary cases the cardiac form may develop suddenly and *vice versa*.

Paralysis of the oesophagus is one of the complications of horse sickness and is usually seen in severe cases of dikkop. At the post-mortem in such cases the oesophagus may be found packed with food.

While it cannot be stated definitely that there exist horses and mules which are not susceptible to horse sickness, horses have been encountered in experimental work which could not be infected. In horse sickness immunity is a relative condition depending both upon the natural degree of resistance possessed by the animal and the virulence of the virus. The latter factor appears to be the predominating one.

A horse which has successfully passed through an attack of the disease can be reinfected, but relapses do not occur.

Figures are not available to show the proportion of cases in which recovered (or salted) animals become reinfected, but it may be gathered from the results obtained in a large number of experimentally immunized horses that the percentage may be as high as 30 and as low as 6.

Death is likely to take place in about 30 per cent. of these cases. The solidity of the immunity conferred by an attack of horse sickness is not related to the severity of the attack. Horses and mules immune to any virus will react to some extent to inoculation with another

virus. The immunity possessed by a horse which has been twice infected is stronger than that produced by a single attack.

Preventive measures.—(1) Preventing the horses from being bitten by the carrier, (2) Protective inoculation. Under the first heading come (*a*) insect-proof stables, (*b*) the application to the skin of some dressing deterrent to insects.

Under the second heading the process of the production of immune serum is described. Blood is passed from the jugular of the virus-producer by direct transfusion into the jugular of the serum-maker. Experience has shown that at least ten litres must be transfused. Bleedings are taken at four intervals of five days each, and 5–6 litres are taken on each occasion. In about 2 per cent. of cases transfusion causes symptoms of intoxication.

For the immunization of mules the virus is the same as that used for the hyperimmunization of horses. At the height of fever the blood is collected in an equal quantity of a mixture of 500 cc. water, 500 cc. glycerine, 5 gm. sodium oxalate, and 5 gm. carbolic acid.

Mules are immunized by the simultaneous injection of virus and serum (300–350 cc.), both intrajugularly.

In the immunization of horses a preliminary intravenous inoculation of 5 cc. of weak virus is given. This is followed on the sixth day with an intravenous inoculation of 3 cc. of strong virus and on the eighth day by an intravenous injection of serum at the rate of ·75 cc. per kilo body weight.

For the injection of serum a long canula of small bore is recommended, as this does not move when the nozzle of the syringe is inserted. Injury to the intima and subsequent thrombosis are thus avoided. A small bore is advised to prevent the too rapid introduction of the serum, which is likely to produce symptoms of shock.

It is most important in selecting virus not to use horses which have suffered either from biliary fever or pernicious anaemia. Any risk of infection with Nuttallia can be prevented by using blood which has been stored for a month. This procedure does not render pernicious anaemia blood safe, as the virus persists for a year or more.

It has to be ascertained whether the immune blood which is collected for serum contains haemolysins. The presence of these is ascertained by mixing 2 cc. of serum with ½ cc. of washed corpuscles and incubating. The percentage of horses rejected for this reason is about 10. As immune serum may contain the virus of pernicious anaemia, experiments have shown that after storage for a year it is no longer virulent, and that the protective properties of the serum are not decreased.

It must be remembered that when horses are being inoculated in succession there is a risk of conveying the virus of pernicious anaemia unless steps are taken to sterilize the syringes after each injection.

Immunized horses must be nursed carefully for a month, and mules for about three weeks, after the operation.

The paper concludes with a list of references to horse sickness.

VAN SACEGHEM (René). **La Transfusion sanguine dans l'Hyper-immunisation des Bovidés contre la Peste bovine.** [Transfusion of Blood in the Hyperimmunization of Cattle against Rinderpest.]—*Bull. Agric. Congo belge.* 1921. Sept. Vol. 12. No. 3. pp. 491–492.

The author has introduced direct transfusion into the method of preparing anti-rinderpest serum as carried out at the laboratories at

Kissegnies, because in his opinion the classical method of injecting several litres of defibrinated or citrated blood subcutaneously is long, laborious, and produces a moderate degree of hyperimmunity only.

The virus-producer is placed in stocks at a level of 1·5 metres above the ground. The animal to be hyperimmunized is placed in stocks at ground level. The blood passes direct from the jugular of the former to that of the latter through a rubber tube armed with a trocar at each end. Three to four litres are allowed to pass. According to the author no complications arise.

[Experiments of this type carried out at Muktesar, India, a few years ago were not so free from complications.—A. L. S.]

VAN SACEGHEM (René). **Étude sur la Production du Serum contre la Peste bovine.** [The Production of Anti-Rinderpest Serum.]—*Bull. Agric. Congo belge.* 1921. Sept. Vol. 12. No. 3. pp. 495–497.

The greater part of this short note is a repetition word for word of another note appearing a few pages earlier in the same number of the journal [*vide supra*].

Hyperimmunization having been carried out by direct transfusion, the animal is bled to the extent of 2–3 litres on the 10th, 14th, 18th and 21st days. It is then left for a month.

The blood is allowed to clot and the serum decanted at 24th, 48th, 72nd and 96th hours. Three litres of blood yield 2 of serum. Carbolic acid is added in the proportion of 0·5 per cent.

VAN SACEGHEM (René). **L'anaphylaxie dans l'Hyperimmunisation des Bovidés contre la Peste bovine.** [Anaphylaxis in the Hyperimmunization of Cattle against Rinderpest.]—*Bull. Agric. Congo belge.* 1921. Sept. Vol. 12. No. 3. pp. 498–501.

In spite of what this author has said regarding the absence of complications in the process of hyperimmunizing by direct transfusion (see above), in this note he states that symptoms of greater or less severity attributable to anaphylaxis are seen with regularity. These symptoms have never been observed during the first hyperimmunization of an animal which has been vaccinated or has recovered from a natural attack, but very frequently during subsequent hyperimmunizations by transfusion. He draws the conclusion that one of the factors in the causation of the symptoms of anaphylaxis is the large amount of antibody present in the serum, and the other is virus and probably toxin. Anaphylaxis is said to be produced when the relationship between virus and antibody is disturbed. In natural cases of infection antibodies are produced during the attack, when antigen is present in large quantities. The neutralization occurs progressively, and antigen is present in larger amounts than antibody. When recovery takes place the small amount of antibody neutralizes the virus and toxins which progressively lose their virulence. Antibodies only appear in more or less considerable quantities when the virus and toxins have disappeared. On the other hand, when antigen is less in amount than antibody the symptoms of anaphylaxis are produced.

It might be objected that when 3 or 4 litres of virus are transfused antigen is in excess, but the author explains that the massive dose of virus is in reality a repetition of small doses, and thus in a sense

the antibody is in excess. He holds that this explanation of the occurrence of the symptoms is supported by the fact that when virus is injected subcutaneously anaphylactic symptoms are not produced. The virus is absorbed slowly from the subcutaneous "pocket," but only after it has been acted upon there by the circulating antibody—the antigen being locally in excess.

The conclusion is drawn that the first hyperimmunizing dose should be given by transfusion and subsequent ones by subcutaneous injection.

Appendix.

The author states that further observations compel him to make a correction in the foregoing, but that the correction goes to strengthen his argument with regard to the causation of the symptoms of anaphylaxis. The correction is that anaphylactic symptoms are frequently produced when the first hyperimmunizing transfusion is given to recently vaccinated or recovered animals. Such symptoms are avoided if an interval of six months is allowed to elapse between vaccination (or recovery) and transfusion. Diminution in the amount of antibody is given as the explanation of this.

Injections of 5–10 cc. of sulphuric ether into the jugular has cut short anaphylactic symptoms which had the appearance of proving fatal.

VAN SACEGHEM (René). **La Vaccination contre la peste bovine.** [Vaccination against Rinderpest.]—*C.R. Soc. Biol.* 1921. Nov. 12. Vol. 85. No. 32. pp. 878–879.

As a result of six months' experience, the author has arrived at the conclusion that the simultaneous method gives very uncertain results, and to replace it has devised the method of giving 0·1 cc. of virus, followed on the second day of the febrile reaction by an intravenous injection of 50 cc. of serum.

In this way the risk of neutralizing the virus is overcome, and by injecting the serum when the animal begins to react to the virus, valuable assistance is given to it.

KÉMARD. **Essais de vaccinations antipesteuses par la procédé Gordziaklowski.** [Vaccination against Rinderpest by Gordziaklowski's method.]—*Rec. Méd. Vét.* 1922. Jan. 15. Vol. 98. No. 1. pp. 23–27.

The method is based upon the possibility of attenuating the virus by heating it to 55° C. This constitutes the first vaccine, in a dose of 1 cc. The second vaccine is simply 2 cc. of defibrinated or citrated blood given 12 days later.

The author has tested the method in 245 animals, and concludes that the method is not of any value. The first vaccine produced no reaction and the "infecting" dose was responsible for a number of deaths. He suggests that the attenuation of the first vaccine was carried too far.

CURASSON (G.). **Les insectes piqueurs peuvent-ils transmettre la peste bovine.** [Can Blood-Sucking Insects transmit Rinderpest?]—*Rev. Gén. Méd. Vét.* 1922. Feb. 15. Vol. 31. No. 362. pp. 57–60.

The small number of experiments recorded in this paper were carried out by the author in Poland with a view to determining whether blood-sucking parasites play any part in the transmission of rinderpest.

Ixodes ricinus and *Tabanus* (? sp.) were used.

1. An engorged tick was removed on the second day of fever and ground up in salt solution. The liquid was injected into a healthy animal and produced a normal attack of the disease.

2. An engorged tick was ground up an hour after removal. The liquid obtained failed to infect healthy animals in three instances.

It would appear that a tick could not carry the virus over to the next phase. But it has been noted in French West Africa that ticks object to engorging themselves on animals that are seriously diseased, and that they drop off sometimes before they are completely engorged. There is, therefore, a possibility that such a tick might carry the infection if another animal were close at hand for it to go to. It is at least shewn that the saliva of the tick is not immediately fatal to the virus.

Tabanidae.—Ten Tabanids were caught while sucking blood on an animal in the third day of fever. A mash of their proboscides caused infection in a healthy animal (single experiment). When Tabanidae were kept for a quarter of an hour before the emulsion of the proboscides was made, this proved to be incapable of setting up infection (a single experiment).

Negative results were also obtained when there was an interval of three quarters of an hour, when the flies were ground up after removal of the proboscides, and when the excreta of flies was used.

As conditions with regard to isolation during the experiments were not above suspicion, no great importance is attached to the positive results obtained.

ROUX (E.), VALLÉE (H.), CARRÉ (H.) & NOCARD (the late). **Résumé d'expériences sur la fièvre aphteuse.** [Résumé of Experiments in connection with Foot and Mouth Disease.]—*Rev. Gén. Méd. Vét.* 1922. Jan. 15. Vol. 31. No. 361. pp. 1–4.

In this short paper the authors assemble some of the information acquired in the course of their investigations carried out between 1901 and 1914.

As the virus has not as yet been obtained in culture, it is maintained by passage through young pigs, the virus obtained being kept between the passages at a temperature below 0° C.

Whatever method of inoculation is used the yield of virus is small. Lymph from vesicles, which is contaminated, and serous exudates maintain their full virulence for about three weeks in the refrigerator. In exceptional cases, in which the virus persists for two months, it is found to be much attenuated.

The best source of virus is the blood of infected heifers taken when the temperature is rising. Pigs are not satisfactory in this respect. Anticoagulants are not employed; the blood is defibrinated mechanically.

Sealed ampoules of defibrinated blood will retain their virulence for several months at 0° C., and for two or three months at 1 to 2° C. Flasks with rubber bungs are equally effective for storing the virus.

Accidental contaminations do not appear to act destructively upon the virus, but dilution is destructive.

The lymph contained in bullae has a higher virus content than the blood, but the highest virus content is to be found in the shreds of shed epithelium. Exudate and epithelium remain infective if diluted twenty thousand times. Pericardial effusions will remain infective if

diluted a thousand times; while virulent serum ceases to be certainly infective in doses of less than 0·2 cc. even by intradermic and intramuscular inoculation.

Desiccation is not so injurious as has been thought. Lymph dried rapidly in vacuo on slides and left at room temperature has proved virulent for young pigs up to 18 days after. Large quantities of blood serum have been found to retain their virulence from 20 to 105 days. In some cases the period of incubation is prolonged, but when infection does not occur the animal is not rendered less susceptible to an ordinary infection. The same result is obtained when animals are inoculated with lymph and blood which have become non-pathogenic through storage. Excluding intradermic, intramuscular and intravenous inoculation, all the methods of experimental inoculation are far less severe than natural infection. As a rule, experimentally produced foot and mouth disease is shewn only by localized lesions of the buccal mucous membranes. Lesions of the teats and digits are not produced. The authors have taken up the question of immunization, and, as a result of their experiments, use virulent blood serum which has been " stabilized " by keeping in a refrigerator for a month. A dose of not less than one cubic centimetre is injected subcutaneously. Larger doses may lead to undesirable results, and smaller ones may not establish immunity. Some hundreds of animals inoculated in this way have developed slight buccal lesions with the exception of two, which shewed lesions of the teats and feet. The immunity conferred is of brief duration and may disappear within six months.

MATTE (E.) & SANZ (B.). **Quelques essais de vaccination préventive contre la fièvre aphteuse.** [Vaccination against Foot and Mouth Disease.]—*Bull. Soc. Path. Exot.* 1921. Nov. Vol. 14. No. 9. pp. 523–530.

In South America the authors found that the intravenous injection of 20 cc. of citrated blood obtained from an infected animal during the eruptive phase of the disease, as recommended by MOUSSU, was not free from danger. They therefore carried out a number of investigations—on several herds where the disease was in existence—using virulent blood heated to different degrees. The protocols for these are given, and the following conclusions drawn.

1. As a rule far fewer vaccinated animals become infected than controls. In some instances no case of foot and mouth disease occurred among the vaccinated animals. Until a better method is discovered, it appears to be valuable to vaccinate with heated virulent blood.

2. It is sufficient to heat the blood to 58° C. for 15 minutes. The dose is 2 cc., and the inoculation is made subcutaneously.

3. The less favourable results obtained in the earlier experiments were possibly due to the animals ccinated being already infected.

KERN (H.). **Untersuchungen über die Folgen der Maul und Klauenseuche beim Rind.** [The Sequelae of Foot and Mouth Disease in Cattle.]—*Schweiz. Arch. f. Tierheilk.* 1921. Dec. Vol. 63. No. 12. pp. 505–523.

In animals which have passed through an attack of foot and mouth disease from 6 to 8 months previously signs of healed ulcers can be found on the tongue. These areas are devoid of papillae, and where

the tongue is pigmented, of pigment. The lesions of the gums heal up and leave no trace of their existence. Those on the pillars of the stomach are recognizable as brownish areas of various sizes. The evidence of the disease is particularly clearly seen in the feet. Double hoofs are very constantly met with. The inner hoof shows black coloured cleft-like defects which on the outer surface are completely closed. In such cases there have been isolated vesicles on the coronary ring beneath the horn which as a result of growth have been pushed down in the horn. The author thinks that these lesions are of importance in that they possibly represent one of the means by which latent infection is carried.

The milk production may fall by from 10 to 90 per cent. In the observations made it averaged 66 per cent.

The functions of the skin may be disturbed. In 33 per cent. of the animals the coat was not changed even in the summer. Dyspnoea is usually associated with the disturbance of skin functions, and is particularly noticeable when animals are put to work.

Abnormalities in connection with the sexual functions in females, such as nymphomania and failure to conceive in spite of normal periods of heat, are observed. Occasionally the growth of young animals is hindered, and in rare cases the udder becomes defective.

The inoculation material known as " Makla " is certainly beneficial when used sufficiently early, that is to say before symptoms develop, but it is of doubtful value when used after symptoms have made their appearance; in such cases the animals suffered as severely as those not inoculated.

BRIDRÉ (J.) & DONATIEN (A.). **Vaccine et Clavelée.** [Cow-pox and Sheep-pox.]— *Ann. Inst. Pasteur.* 1921. Nov. Vol. 35. No. 11. pp. 718–740.

The authors review at some length the literature dealing with the unity or plurality of variola, cow-pox and sheep-pox, and then detail the experiments which they have performed with a view to determine whether cow-pox and sheep-pox are identical. Variola has not been taken into consideration.

The experiments are grouped under the following headings :—I. Vaccinia in the sheep. Passage of vaccine virus from sheep to sheep. II. Does the inoculation of sheep with vaccine virus confer immunity against further inoculations with the same material? III. Does vaccination confer immunity against sheep-pox? IV. Can cow-pox be transformed into sheep-pox ? V. Is sheep-pox inoculable to species other than the ovine ? Can it be transformed into cow-pox ? VI. Does sheep-pox immunize against cow-pox ?

It is an opinion which may be held, and which the authors are not prepared to contradict, that the viruses of cow-pox and sheep-pox have a common origin. They have not, however, been able to transform either disease into the other. Cow-pox, when conveyed to the sheep, has maintained its own characters. They think, however, that certain conclusions may be drawn from their experiments.

1. Vaccinia is inoculable to the sheep, and sheep can be used for culture *in vivo* in series for the production of vaccine virus.

2. Inoculation with vaccine virus protects a sheep, at least for a time, against a fresh inoculation, provided the first inoculation results in a sufficiently marked reaction.

3. Vaccine virus does not protect against sheep-pox.

4. Sheep-pox does not protect a sheep against vaccinia, and it may be added that the inoculation of other animals with sheep-pox virus does not protect them against vaccine virus.

5. In the authors' experience the two viruses behave as though they were quite different.

GOULAY (M. A.). **Traitons les chiens contre la rage, au lieu de les tuer.** [Should Dogs be immunized against Rabies instead of being destroyed.]—*Rec. Méd. Vét.* 1921. Oct. Vol. 107. No. 19. pp. 561–568.

LELEN (R.). **Contribution à l'étude de la fièvre aphteuse en Tunisie.** [Foot and Mouth Disease in Tunis.]—*Rec. Méd. Vét.* 1921. Nov. 15. Vol. 107. No. 21. pp. 625–639.

LEYNEN (E.). **La epizootiá de peste bovina en Bélgica.** [The Outbreak of Rinderpest in Belgium.]—*Rev. Hyg. y Sanidad Pecaurias.* 1921. Oct. Vol. 11. No. 10. pp. 511–519.

LIGNIÈRES (J.). **La peste bovina.** [Cattle Plague.]—*Revist. Zootéc.* 1921. Mar. Vol. 8. No. 90. pp. 87–98.

PAUL-MAUCEAU (G.). **Vaccination préventive contre la fièvre aphteuse par vaccin non specific.** [Vaccination against Foot and Mouth Disease with Non-Specific Vaccine.]—*Rev. Path. Comp. et Hyg. Gén.* 1921. Sept. 20 and Oct. 5. Vol. 21. No. 190. pp. 303–307.

VAN SACEGHEM (R.). **L'anaphylaxie dans l'hyperimmunisation des bovidés contre la peste bovine.** [Anaphylaxis during Hyperimmunization of Cattle against Rinderpest.]—*C.R. Soc. Biol.* 1921. Dec. 10. Vol. 85. No. 36. pp. 1105–1106.

MYCOTIC DISEASES.

BROCQ-ROUSSEU. **Sur la lymphangite épizootique.** [Epizootic Lymphangitis.]—*Rec. Méd. Vét.* 1922. Feb. 28. Vol. 98. No. 4. pp. 84–91.

The author claims that in collaboration with MATRUCHOT he has been able to demonstrate a conidial form of the parasite of epizootic lymphangitis.

Some cultures of the organism obtained from BOUQUET and NÈGRE were left at room temperature, and after several weeks were found to have developed an abundance of white aerial growth. Cultures from this powdery material were made in broth containing 1 per cent. xylose and a mycelial growth developed. On the surface of the broth there was a white " crust " composed of conidial forms.

Subcultures were obtained on various media when the temperature was kept at about 25° C. A parallel series incubated at body temperature failed to grow, or grew to an insignificant extent only. This point is of importance, since the cultures of BOUQUET and NÈGRE developed well at 38°. They, however, had found that at temperatures below 37° the cultures developed a more pronounced downy appearance.

Brocq-Rousseu claims to have produced similar white growths both from various cultures of the cryptococcus and from lesions direct. The determining factor in the production of such cultures is to keep the temperature at about 25° C.

The maximum development of spores on carrot " juice " is obtained when the medium contains 16–20 per cent. of sugar (expressed as reducing sugars). The cryptococcus will not grow on the surface of Sabouraud, but filaments develop in the depth of the medium and by lifting the superficial layer produce an irregular surface. While multiplication

proceeds in the depth of the medium, and while there is sufficient moisture, the culture remains greyish yellow or brownish in colour. Subsequently, when the surface becomes desiccated and fissures make their appearance, aerial filaments bearing conidia are developed.

Conidia are very small, pyriform and sessile, isolated or in small groups. The conidiophores are in clusters. These characters indicate that the fungus approximates to the genus *Botrytis*, Micheli and Link.

The author discusses briefly the biological classification of the parasite.

Attention is drawn to the point that so far as Northern Africa is concerned, epizootic lymphangitis exists as an epidemic in those places where the temperature limits are those required for artificial cultivation as described above (20–25° C.). The possibility of insects acting as vectors of the spores is indicated by the fact that multiplication of the parasite takes place on straw and manure.

It has not been found possible so far to stain the cryptococcus selectively. Examination of unstained moist preparations under a cover-glass is advised.

Vaccination appears at the moment to be the method of choice for the treatment of the condition, but the prolonged treatment sometimes necessary is against its application.

MISCELLANEOUS.

WEBSTER (P. J.). **Napier Grass. A Promising New Forage Plant for the Philippines.**—*Philippine Agric. Rev.* 1920. Vol. 13. No. 4. pp. 353–354. With 1 plate.

Napier grass, *Pennisetum purpureum*, is a coarse perennial grass attaining a height of 5 metres or more if left unchecked. It is a native of tropical Africa and was first domesticated in Rhodesia in 1909. It is now grown in the United States, Cuba, Queensland, and possibly elsewhere. In the Philippines it has shown itself well adapted to climate and soil, and to be more drought-resistant than any other forage plant introduced as yet.

In the rainy season it makes a very heavy growth, and while a comparative test has not been made, it is apparent that in yields of green fodder the grass is superior to all other forage plants grown in the archipelago.

In Cuba, Napier grass is reported to yield over 550 tons of green forage per hectare [2½ acres roughly.—Ed.] per year. Seeds are difficult to germinate but cuttings grow readily. Cuttings should be 6–8 inches long and should have one or two joints. Where the internodes are long the topmost joint should be not more than 2 inches below the top end of the cutting.

After ploughing and harrowing, the cuttings should be planted 16–20 inches apart in rows, with a space of about 4 feet between the rows. When material is abundant, whole canes may be laid flat in a shallow furrow and covered with soil. When material is scarce it is better to plant cuttings and push them diagonally into the soil so that the tops are flush with the surface. The grass should not be allowed to grow to more than 2–3 feet high before cutting, as it is liable to become woody.

Depending upon the quality of the soil and the rainfall, six to nine cuttings may be made the year after the plants are established. In places where there is a long dry season planting should be done after the onset of the rains.

The food value of the grass is indicated by the analysis :—

Water	61·81
Protein	2·92
Carbohydrates	17·29
Fat	·29
Fibre	14·77
Ash	2·92

Merker grass, a variety of the same species, is less coarse. Both will stand moderate continuous pasturing when well established.

Cuttings may be obtained by application to the Director of Agriculture, Manila. [It will be interesting to hear whether this grass makes good silage.—A. L. S.]

YAKIMOFF (W. L.) & WASSILEWSKY (W. J.). **Experimentation avec le "Dissodoluargol" de Danysz.** [Experiments with Danysz's "Dissodoluargol."]—*Bull Soc. Path. Exot.* 1921. Dec. Vol. 14. No. 10. p. 640.

The results of experiments carried out with Luargol were reported by the author in the *C.R. Soc. Biol.*, April 27, 1917.

The new drug has the advantage of being water-soluble if mixed with soda.

Mice infected with dourine were used, and the active dose was found to be 1 cc. of a 1 in 900 solution for a mouse of 20 grammes. The fatal dose was 1 cc. of 1 in 200 solution. The therapeutic index of the new drug was 1–3·6 (as compared with 1–3 in the case of Luargol). Relapses, when they occurred, were delayed.

WOODCOCK (H. M.). **An Introduction to the Study of Haematophagy. II. Haematophagy as a Pathological Occurrence.**—*Jl. Roy. Army Med. Corps.* 1921. Dec. Vol. 37: No. 6. pp. 418–431. With 2 text figs and 1 plate.

Negri Bodies.—"Among my preparations of the Negri bodies are certain which were kindly given by Negri himself, some years ago . . . . . .

"One of these is an ordinary Giemsa smear . . . The smear is . . . well fixed and stained. But it follows that, from the smear alone, it cannot be said definitely what was intracellular, and what was extracellular; where I indicate which, in my opinion, of the two conditions was the case with respect to any particular body, I am having regard also to the situation of the corresponding forms, as seen in sections . . . . . .

"A regular series of transitions can be found between what are undoubtedly red corpuscles, or corpuscular masses, and fully formed Negri bodies."

PANISSET (L.) & VERGE (J.). **De l'action du Novarsénobenzol chez le chien.** [The Action of Novarsenobenzol on the Dog.]—*Rec. Gén. Méd. Vét.* 1922. Mar. 15. Vol. 31. No. 363. pp. 121–128.

Novarsenobenzol may be injected subcutaneously or intravenously. By the former route very dilute solutions (in distilled water) must be used, as the drug is liable to produce necrosis if concentrated solutions are introduced into the subcutaneous tissue. For intravenous injection concentrated solutions may be employed, but care must be taken that

the whole dose passes into the vein and that none escapes into the perivascular tissues. The minimum toxic dose for the dog is, as in the case of the human subject, 15 cgm. per kilo body-weight.

Five centigrammes per kilo was found to be too large for therapeutic purposes, and the therapeutic dose was therefore fixed at 2 cgm. It was thought advisable to give this in two halves at an interval of a day. If a single dose is to be given, the 2 cgm. may be injected at one time. If, however, repeated doses are to be given, it is better to use dilute solutions (at least 1 in 20) and to give two doses of 1 cgm. on consecutive days, leaving a day's interval before proceeding to the next two injections.

Immediately after injection there may be symptoms indicative of intolerance, such as slight dyspnoea and temporary dullness. On numerous occasions injected dogs have been observed to stretch themselves and yawn. Frequent vomition and more or less violent expulsive efforts, resulting in copious defaecation, may be observed at first, but these symptoms soon disappear.

The injection of novarsenobenzol is followed by a marked rise of temperature without upsetting the animal in any way. With doses of 5–10 cgm. this febrile reaction may last for more than 24 hours.

When repeated doses are given a certain degree of tolerance is established, which results in the practical disappearance of the symptoms described.

When doses of from 5–10 cgm. per kilo are given repeatedly a marked improvement in condition is brought about. But parallel with this there are certain symptoms which show that the toxic dose is being approached. The first of these is the presence of albumen in the urine. There is always a marked amount of albumen in the urine after the injection of novarsenobenzol, which tends to disappear in the intervals between injections, to reappear immediately a fresh dose is given. In a number of cases bile pigments can be demonstrated in considerable amounts in the urine.

The eyes are particularly susceptible to novarsenobenzol, and after a single dose of 15 cgm. per kilo complete blindness may result.

The most important local effect produced by the injection of novarsenobenzol is necrosis of the tissue when a too concentrated solution is employed. The local irritant action of the drug depends entirely upon the concentration used.

For subcutaneous injections only dilute solutions (not exceeding 5 per cent.) should be used, and if stronger solutions are employed for intravenous injections the utmost care must be taken to prevent any escaping from the vein to the connective tissues. Should some escape and set up severe disturbance there, obliteration of the vein follows.

Coagulation of the blood is retarded by the drug, in one instance blood taken from the saphena vein " some time " after the injection remained liquid for more than 24 hours.

No precipitation has been observed when novarsenobenzol and serum have been mixed *in vitro*, such as had been observed in human practice.

ALLEN (H.). **An Indian Liquorice-poisoning Experiment.**— *Vet. Jl.* 1922 Feb. Vol. 78. No. 2. pp. 58–59.

SINCLAIR (J. M.). **A Short History of the Infective Diseases amongst the Domestic Animals of Southern Rhodesia since the Occupation.**—*Rhodesia Agric. Jl.* 1922. Feb. Vol. 19. No. 1. pp. 10–20.

REPORTS.

UNION OF SOUTH AFRICA. **Annual Report of the Department of Agriculture for the Year ended June 30th, 1921.**—From the *Jl. Dept. Agric.* 1922. Jan. Vol. 4. No. 1.

ANNUAL REPORT OF THE SECRETARY FOR AGRICULTURE.

Services of Veterinary Surgeons to the Public:—

"A system of payment for veterinary services for the treatment of of non-scheduled diseases has been introduced, and a veterinary surgeon will be expected to attend to non-scheduled cases if his more important work permits. It is hoped that in the course of time the reception of the scheme by the public will be such as to indicate that private veterinarians are able to practise their profession in a number of districts."

Scab in Sheep and Goats.—Progress in the eradication of these diseases is slow, the main difficulty being apparently that the responsibility for eradication is thrown on the department instead of on the owners. The time seems to be ripe for legislation of a more drastic character.

East Coast Fever.—In the Transkeian Territories about two-thirds of the districts are infected. In Natal 27 out of 43 districts are infected, and in the Transvaal 6 out of 25. The value of dipping is being more appreciated, and the erection of dipping tanks is being pushed with greater speed than last year.

Anthrax.—Outbreaks are numerous and widespread. Importance attaches to this in view of the value of skins and hides exported.

Nagana.—Further land settlement in the neighbourhood of the game reserve in Zululand has been rendered impossible owing to losses among cattle from nagana. The establishment of a Veterinary Research and an Entomological station in Zululand is in progress.

REPORT No. II. VETERINARY DIVISION. [BORTHWICK (J. D.).]

East Coast Fever.—In some districts there is a diminution and in others an increase. In the Pretoria area the increase is from 27 to 87 infected farms. These form a continuous block, the disease spreading gradually from farm to farm. Overlapping of cattle is the main cause. Dense bush and the absence of fencing render the prevention of this impossible. The number of tanks erected has increased from 126 to 258, and 110 are under construction.

Tuberculosis.—Pressure of other work and lack of funds has prevented this from being taken in hand properly.

Anthrax.—The continued prevalence is largely due to concealment of cases in native-owned herds for the sake of the hide. The new spore vaccine is giving good results.

Epizootic lymphangitis.—Eight of the ten outbreaks in the whole province were in the Bathurst and Humansdorp areas.

Dourine or Slapziekte.—Is chiefly confined to the Cape Province, but one outbreak occurred in the Transvaal. Its presence in the Orange Free State is suspected. It is very widespread in Griqualand West and British Bechuanaland. In these areas 39 outbreaks, involving 3,270 animals, occurred. A great factor in the spread of the disease is the concentration of mobs of horses at high altitudes to escape horse sickness.

REPORT No. III. VETERINARY EDUCATION AND RESEARCH.
[DU TOIT (P. J.).]

Horse Sickness.—Inoculations of mules were carried out in the districts to the number of 2,847. The mortality was 1·89 per cent. The causation of staggers in inoculated horses is still under investigation, but nothing has been discovered to disprove the theory that it is due to some latent infection quite distinct from horse sickness.

In Griqualand West the disease was particularly severe throughout the year. Observations indicated that mosquitoes were not the sole, or even the chief, transmitters in this case. On many farms the disease spread like a contagious disease.

Lamziekte in Cattle.—Attempts are being made to find an efficient and cheaper substitute for bone meal manure. The results indicate that a manure rich in phosphorus prevents pica. A pica survey of the whole Union is being undertaken in conjunction with the Botanical Survey Committee.

Contagious Abortion of Cattle.—Experiments confirmed the previous conclusions that satisfactory immunity can only be established by the use of live vaccine.

Anthrax.—Satisfactory results have been obtained from the use of the new spore vaccine. Although forms asking for certain particulars were sent out with each supply of vaccine, only 5 per cent. of these were returned. It is concluded that had the results been unsatisfactory in the remaining 95 per cent. of cases the Department would have heard about it. The vaccine appeared to affect dairy cows adversely as regards milk yield, and a new vaccine to overcome this difficulty is being prepared. Further, the use of the vaccine caused a local swelling (which was rarely followed by fatal results), but owners are now accustomed to this and do not object ; in fact the degree of swelling is taken as some guide as to the degree of immunity.

Quarter Evil.—In some cases it appeared that the vaccine did not yield a degree of immunity sufficient to protect against the local virus. In such cases vaccine was prepared from the muscle of an animal dead in the district and used for that particular outbreak.

Attempts are being made to prepare a liquid vaccine, as there is a risk that animals may get too much or too little muscle powder held in suspension in a liquid.

CANADA. **Department of Agriculture. Report of the Veterinary Director-General, for Year ending March 31 1921.** [TORRANCE (F.), Veterinary Director-General.]—Ottawa : F. A. Acland.

The change from ranching to farming in Alberta has rendered it possible to stamp out cattle mange there. This area has been under restrictions since 1904, but it has only been since fencing of farm lands, and enclosure of pastures has been carried out that success has been attained. Dipping tanks were erected and so placed that no animal had to travel more than 12 miles to be dipped. Dipping was carried out on June 24 and July 2, and all movements of cattle were suspended during the dipping period, and heavy penalties were prescribed for those who neglected or refused to dip their animals. So carefully had the details of the scheme been worked out, and so thoroughly was it carried out that it resulted in the complete eradication of the disease, " so that there is now no mange area in Canada for the first time for 26 years."

The organization of the scheme for the simultaneous dipping of all cattle in the mange area in Alberta (comprising 74,952 square miles) was as follows.

The area was divided into districts, each of which was placed under the charge of a Veterinary Inspector with range riders to assist him.

The districts were subdivided and committees of stock owners chosen for each. These committees were instructed in their duties at a series of meetings throughout the area. These committees did the work of compiling lists of owners and the number of their animals, with their location, and the number and situation of the tanks.

The members of the owners' committees were detailed for separate duties as follows :—

1. Seeing that the tanks (or vats as they are termed in the Report) were in proper order.
2. That adequate supplies of lime and sulphur were at hand.
3. Supervision of the gathering of the cattle.
4. Proper control of the animals between their dippings.
5. Supervision of the preparation of the dip.
6. Supervision of the working of the vat, and maintenance of the vat at the correct temperature.
7. Keeping records.

Tuberculosis.—The accredited herd plan was put into operation in September, 1919, and applications for herds to be tested are very numerous.

The cleaning up of an infected herd is not a simple matter . . . . . Experience proves that an advanced case and an incipient case may fail to react. The incipient case will be detected when tests are repeated (after 60 days), but the advanced non-reactor is a more difficult problem. Occasionally an advanced case may survive several tests and remain a source of infection in the herd.

The final test before a herd becomes accredited is carried out a year after a completely clean test has been obtained. Animals which it is desired to import into the herd to make up for those destroyed, must pass a test before they can be brought on to the farm, and must then be isolated for 60 days and pass a second test before they can be admitted to the herd.

" This adds very greatly to the work of our inspectors, and as we advance will still further impede our progress. We appear to be dragging a chain which lengthens at every step. Relief will be in sight when we have a list of fully accredited herds from which purchases can be made, and when the time arrives for turning over the herds which have been fully accredited for one year to the future control of an approved practitioner."

In the tests carried out under the accredited herd plan, 15·88 per cent. of reactors were detected.

BENGAL. **Annual Report of the Bengal Veterinary College and of the Civil Veterinary Department, Bengal, for the year 1919–1920.**—Calcutta: Bengal Secretariat Book Depot. 1920. [Price As. 12.]

CEYLON. **Report of the Government Veterinary Surgeon, for 1920.** [STURGESS (G. W.), M.R.C.V.S.]—1921. 6 pp. Colombo.

MADRAS. **Annual Administration Report of the Civil Veterinary Department, Madras Presidency, for 1920–1921.** [AITCHISON (D. A. D.), I.C.V.D., Principal.]—1921. 20 pp. Madras: Supt. Govt. Press. [Price As. 2.]

NORTH-WEST FRONTIER PROVINCE. **Report of the Civil Veterinary Department for the year 1920–21.**—Peshawar: North-West Frontier Province Govt. Press. [Price As. 13.]

UNITED PROVINCES. **Annual Report of the Civil Veterinary Department, United Provinces, for the year ending March 31 1920.**—Allahabad: Printed by the Supt., Govt. Press, United Provinces, 1920. [Price As. 11.]

BOOK REVIEW.

EDMONDS (C. R.) [M.R.C.V.S., Assistant Chief Veterinary Surgeon, Rhodesia]. **Diseases of Animals in South Africa.**—pp. xi + 477. With 35 text figs. Demy 8vo. 1922. London: Baillière, Tindall & Cox, 8, Henrietta Street, Covent Garden. [Price 25*s.*]

"The cause that led to the attempt of this work was the feeling that there was need for a book dealing with the more serious diseases affecting farm animals in South Africa as distinct from other lands.

"The admirable works dealing with animal diseases in other parts of the world, and to which we in South Africa are greatly indebted, do not treat the diseases peculiar to this subcontinent in a manner, if at all, in which they have been chronicled from actual experience in this country by a number of veterinary surgeons and other writers in our agricultural press."

These are the opening paragraphs of the preface to the volume under review and they lead one to anticipate finding within it a masterly summary of the practical experience of the man on the spot and a full and up-to-date account of those diseases which, if not peculiar to South Africa, may certainly be said to have their home there.

These anticipations are scarcely realized, for the tick- and fly-transmitted diseases and those due to ultravisible viruses occupy only a small fraction of the volume. The author has not confined himself to his self-imposed limits, but has given descriptions of diseases which have a very wide distribution, such as strangles, pneumonia, mammitis, actinomycosis, navel ill, tetanus, anthrax, black quarter, tuberculosis, and so on. Diseases caused by worms and other metazoan parasites which occur in practically all parts of the world are also dealt with. The volume is in fact a brief treatise on the diseases of domesticated animals. Those diseases, of which the author's experience must be very extensive are very briefly described. One would have expected a wealth of practical detail in the accounts of the tick-borne diseases but this, unfortunately, is not found. For example, the whole subject of dipping is dealt with in a few generalizations scattered here and there in the text.

The author acknowledges his indebtedness to writers in the agricultural press in South Africa and to certain standard textbooks on the subjects of diseases of domesticated animals and parasitology, but fails to mention at least one source from which he seems to have derived help. Members of the Post-Graduate Courses, held at the Royal Veterinary College, will recognize that the author has made a free use of the notes of the lectures given there.

The general get-up of the volume, printing and reproduction of illustrations, reflect credit upon the publishers.

A. Leslie Sheather.

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